

**DESCRIPTION OF MAP UNITS**

**UNCONSOLIDATED CONTINENTAL SHELF SEDIMENTS**

- Ss(a)m\_ru: Soft, unconsolidated sediment (sand and mud), predominantly rippled
- Ss(a)m'rw\_u: Unconsolidated dynamic mound of sediment (sand and mud), in delta zone
- Ss(a)m'rw\_u: Unconsolidated dynamic mound of sediment (sand and mud)
- Ss(a)m'ru: Unconsolidated mound of sediment (sand and mud)
- Ss(a)\_ru: Soft, unconsolidated sediment (sand), predominantly rippled
- Ss(a)\_ru: Soft, unconsolidated delta sediment (sand), predominantly rippled
- Ss(a)rw'rw\_u: Soft, mobile sediment window that has unconsolidated and rippled sediment waves, overlying scoured lag pavement of sand and gravel
- Ss(u)\_u: Depression in soft, unconsolidated sediment

**MIXED SUBSTRATE ON CONTINENTAL SHELF**

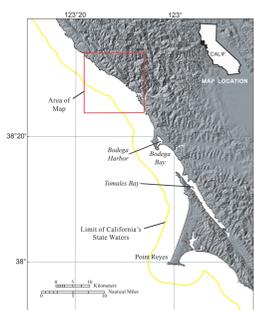
- Sme\_c'u: Mixed habitat of soft, unconsolidated sediment, overlying hard, consolidated sedimentary bedrock
- Smb'p\_c'u: Mixed habitat of sedimentary boulders or pinnacles with unconsolidated sediment

**HARD SUBSTRATE ON CONTINENTAL SHELF**

- Shr\_c: Hard, consolidated sedimentary bedrock
- Shd\_c'df: Fractured, deformed, and differentially eroded sedimentary bedrock
- Shb'p\_c: Boulder or pinnacle of hard sedimentary rock

**EXPLANATION OF MAP SYMBOLS**

- Contact
- Area of "no data"—Areas near shoreline not mapped owing to insufficient high-resolution seafloor mapping data; areas beyond 3 nautical-mile limit of California's State Waters were not mapped as part of California Seafloor Mapping Program
- 3-nautical-mile limit of California's State Waters
- 10 Bathymetric contour (in meters)—Derived from modified 2-m-resolution bathymetry grid. Contour interval: 10 m



**DISCUSSION**

This map shows "potential" marine benthic habitats in the Offshore of Fort Ross map area. Marine benthic habitats represent a particular type of substrate, geomorphology, seafloor process, or any other attribute that may provide a habitat for a specific species or an assemblage of organisms. Such maps are based largely on seafloor geology, and this map integrates seafloor geology (sheet 10) with information depicted on several other thematic maps of the Offshore of Fort Ross map area: high-resolution bathymetry (sheet 1), shaded-relief imagery (sheet 2), backscatter (sheet 3), and ground-truth information (sheet 6). This map also uses information from the uSEABED bottom sampling compilation by Reed and others (2006). The combination of remotely observed data (for example, multibeam bathymetry and backscatter, seismic-reflection profiles) and directly observed data (for example, camera transects, sediment samples) translates to higher confidence in the ability to interpret broad areas of the seafloor (fig. 1).

To avoid any possible misunderstanding of the term "habitat," the term "potential habitat" (as defined by Greene and others, 2005) is used herein to describe a set of distinct seafloor conditions that the feature may qualify as an "actual habitat." Once habitat associations of a species are determined, they can be used to create maps that depict actual habitats, which then need to be confirmed by "ground-truth" surveying using in situ observations, video, and/or photographic documentation.

Marine benthic habitats are classified using the Benthic Marine Potential Habitat Classification Scheme, a mapping-attribution code developed by Greene and others (1999, 2007). In this map series, habitat classification codes are based on the deepwater habitat-characterization scheme developed by Greene and others (1999), which was created to not only easily distinguish marine benthic habitats but also to facilitate ease of use and queries within GIS and database programs. The code, which is summarized in chapter 6 in the accompanying pamphlet, is derived from several categories of the Benthic Marine Potential Habitat Classification Scheme (Greene and others, 1999, 2007), and it can be subdivided on the basis of the spatial scale of the data.

High-resolution, multibeam-sonar data, converted to bathymetric depth grids (seafloor digital elevation models; sheet 1), are essential to development of the habitat map, as is shaded-relief imagery (sheet 2), which allows for visualization of seafloor terrain and provides a foundation for interpretation of submarine landforms. Areas of seafloor bedrock exposures are identified by their common sharp edges and high relative relief; these may be contiguous outcrops, isolated parts of outcrop protruding through sediment cover (pinnacles or knobs), or isolated boulders.

Backscatter maps (sheet 3) also are essential for developing potential benthic habitat maps. High backscatter is further indication of "hard" bottom, consistent with interpretation as rock or coarse sediment. In many locations, areas within or around a rocky feature appear to be covered by a thin veneer of sediment, identified on the habitat map as "mixed" substratum (in other words, containing both rock and sediment). Broad, generally smooth areas of the seafloor that lack sharp and angular edge characteristics are mapped as "sediment" and are further defined by various sedimentary features such as erosional scars and depressions, as well as depositional features such as dunes, mounds, or sand waves. Low backscatter, indicative of a "soft" bottom, also significantly aids identification and classification of sedimentary habitats.

The Offshore of Fort Ross map area contains 13 potential marine benthic habitat types, covering 117.10 km<sup>2</sup>, all of which are on the continental shelf ("Shelf" megahabitat). These include unconsolidated sediments (eight habitat types), mixed substrate (two habitat types), and hard substrate (three habitat types). The predominant habitat type is soft, unconsolidated sediment, which covers 107.26 km<sup>2</sup> (91.6 percent) of the total area mapped. Exposed hard bedrock covers 8.53 km<sup>2</sup> (7.3 percent), and sediment-covered bedrock, which is of the mixed hard-soft induration class, covers 1.31 km<sup>2</sup> (1.1 percent). Rock outcrops and rubble are considered the primary habitat types for rockfish and lingcod (Cass and others, 1990; Love and others, 2002), both of which are recreationally and commercially important species.

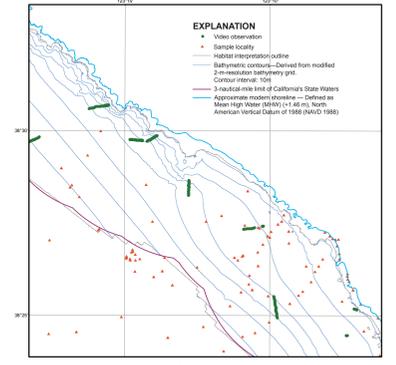


Figure 1. Map showing view-observation locations and sample localities for Offshore of Fort Ross map area.

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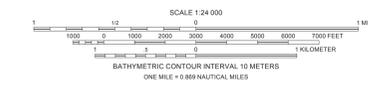
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Shoreline elevation data from National Oceanic and Atmospheric Administration's (NOAA) Digital Coast (available at <http://www.dcoast.gov/>) and from the U.S. Geological Survey's National Elevation Dataset (available at <http://ned.srs.gov/>). California's State Waters limit from NOAA Office of Coast Survey.

Universal Transverse Mercator projection, Zone 10N

**NOT INTENDED FOR NAVIGATIONAL USE**



Potential marine benthic habitats mapped by Bryan E. Dieter, H. Gary Greene, and Charles A. Endris, 2012-2013. Bathymetric contours by Charles A. Endris, Mercedes D. Erdey, and Erik N. Lowe. GIS database and digital cartography by Charles A. Endris, Mercedes D. Erdey, and Erik N. Lowe. Manuscript approved for publication November 5, 2015.

**Potential Marine Benthic Habitats, Offshore of Fort Ross Map Area, California**

By  
Bryan E. Dieter,<sup>1</sup> H. Gary Greene,<sup>1</sup> Charles A. Endris,<sup>1</sup> Mercedes D. Erdey,<sup>2</sup> and Erik N. Lowe<sup>2</sup>  
2015

<sup>1</sup>U.S. Geological Survey  
<sup>2</sup>U.S. Geological Survey



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